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TANNING AT HOME

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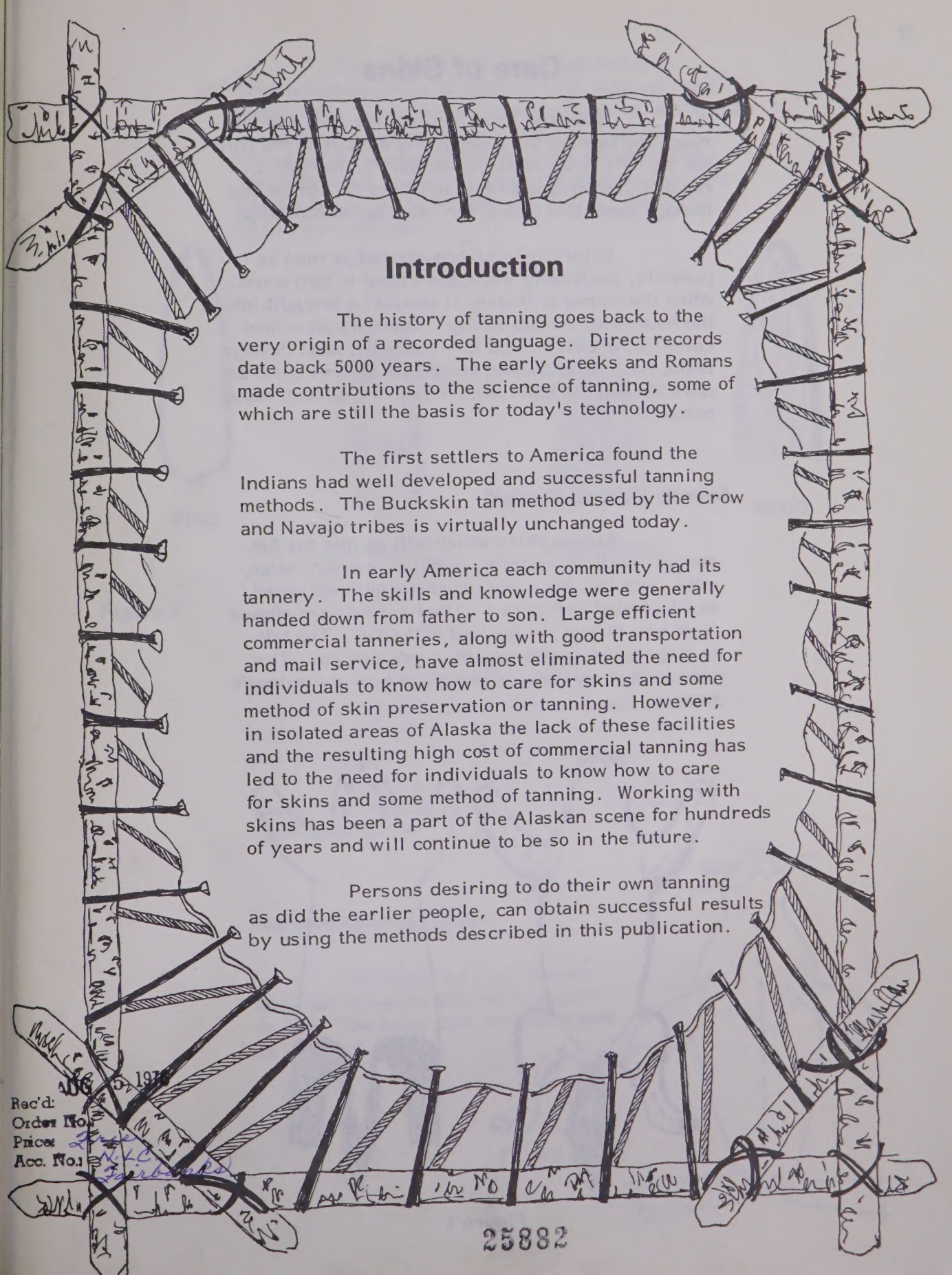

Introduction

The history of tanning goes back to the very origin of a recorded language. Direct records date back 5000 years. The early Greeks and Romans made contributions to the science of tanning, some of which are still the basis for today's technology.

The first settlers to America found the Indians had well developed and successful tanning methods. The Buckskin tan method used by the Crow and Navajo tribes is virtually unchanged today.

In early America each community had its tannery. The skills and knowledge were generally handed down from father to son. Large efficient commercial tanneries, along with good transportation and mail service, have almost eliminated the need for individuals to know how to care for skins and some method of skin preservation or tanning. However, in isolated areas of Alaska the lack of these facilities and the resulting high cost of commercial tanning has led to the need for individuals to know how to care for skins and some method of tanning. Working with skins has been a part of the Alaskan scene for hundreds of years and will continue to be so in the future.

Persons desiring to do their own tanning as did the earlier people, can obtain successful results by using the methods described in this publication.

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Care of Skins

It is most important that the skin should reach the tanning vat without any damage to the hair for the hair is the most valuable part. Fur skins require greater attention than others for almost any damage leads to a loss of fur, also called hair slip.

Skinning should be started as soon as possible, preferably while the animal is still warm. When the animal is frozen, it should be brought into the house and thawed slowly. Skinning an animal cased is the best method for it does the least damage to the fur. Hand pulling should be used as much as possible and the knife used only to cut subcutaneous muscles.

Animals Skinned "Cased"

Animal skins which will go into the fur market, such as squirrel, muskrat, marten, otter, mink, and fox, etc., are generally skinned cased, as illustrated in Figure 1. The hind legs are ripped from heel to heel via the root of the tail. The tail is ripped part way down, then stripped out. The skin is then carefully pulled down over the animal's head.

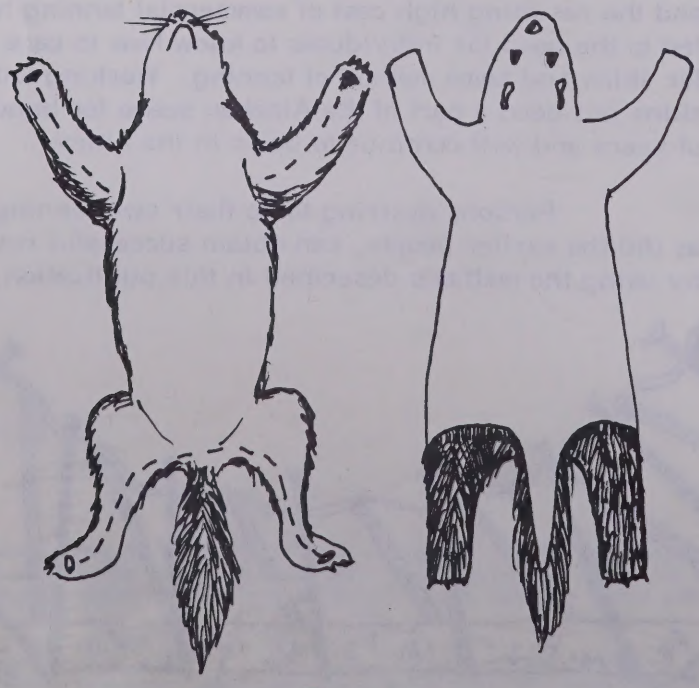


Figure 1

The pelts are fleshed, then put onto drying frames or fur stretchers flesh side out until almost dry. Some fur stretchers are shown in Figure 2. In Alaska, the muskrat is the only pelt that is not reversed while still flexible and allowed to dry completely fur side out. Sizes and shapes of drying boards for different animals are shown in the back of this publication.

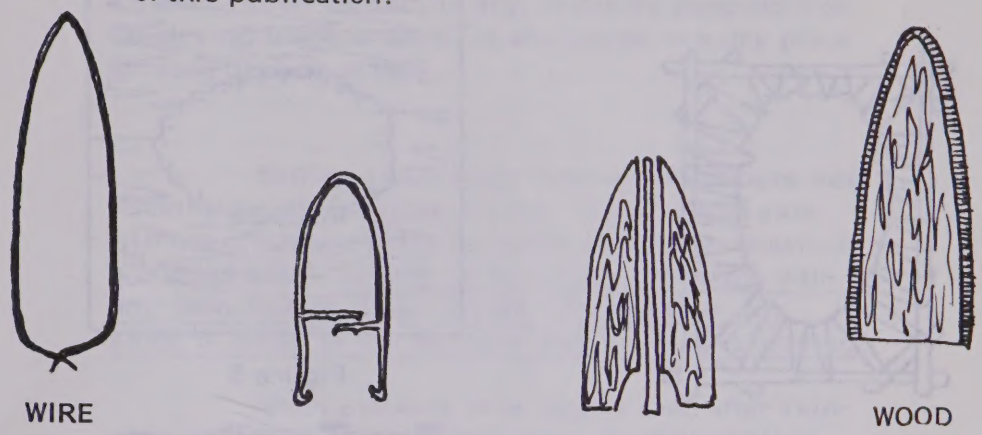


Figure 2

Fur pelts are not usually salted, but experience has indicated they soften and tan better if they are salted before they are stretched and dried to their normal shape. A dull knife or old spoon may be used to scrape off all fatty tissue and flesh.

After the pelts are dried, they can be stored in a cool, dry place until you are ready to start tanning.

Animals Skinned Open

Animals like seal, beaver and bear are generally skinned open or flat. The basic cuts are illustrated in Figure 3.

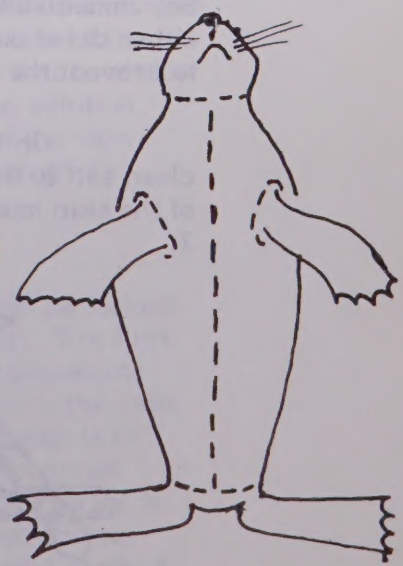


Figure 3

The pelts are stretched by lacing to a frame or hoop, Figure 4, or by nailing to plywood, hair side down and the skin pulled up to the head of the nail, Figures 5 and 6, to allow for complete drying. Beavers are stretched round; all other open skins are stretched to their natural shape.

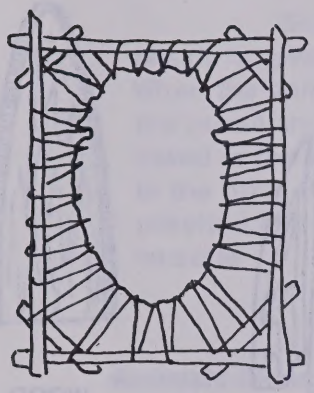


Figure 4

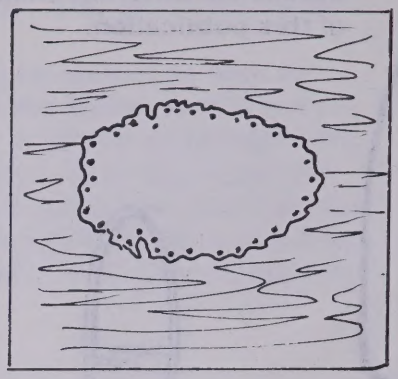


Figure 5

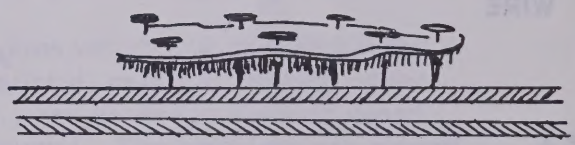


Figure 6

Preventing Skin From Rotting (Hair Slip)

The two things that cause damage to raw furs are moisture and warm temperature. A fresh, wet, and warm skin is a very good place for bacteria to grow that cause the skin to rot and hair to fall out. So, immediately after skinning, the skin must be either dried out or the temperature lowered or both to prevent the bacteria from damaging the skin.

On large skins such as seal, the addition of clean salt to the flesh side will pull the moisture out of the skin much quicker than natural drying, Figure 7.

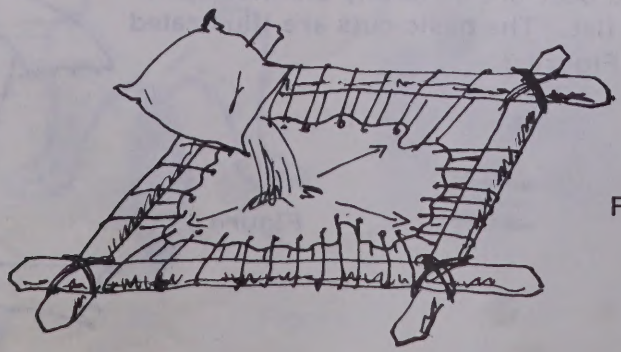


Figure 7

Stretch the skin out flat, flesh side up, and cover it with about 1/8 inch of salt. A good guide on the amount of salt to use is a pound of salt for each pound of skin. Rock salt or ice cream salt is suitable as long as it is clean. After three days, shake off all excess salt and keep the skin in a cool, dry place until completely dry. Do not put it in the sun or near a stove. When the skin is dry, it can be removed from the drying frame or plywood and stored in a dry place for long periods of time.

Salting a skin helps prevent skin fibers from sticking together during drying. A salt-cured skin will not crack and break as easily as does an unsalted, air-dried skin. Salting is especially desirable with any skin that is to be tanned with the hair on, since it helps to set the hair and prevents shedding.

When a skin is to be tanned soon after skinning, it can be rinsed in cool water to remove blood stains, fleshed good, and then washed with a detergent in lukewarm water to help remove all the fat. After the washing, the skin is rinsed in clean water and should be ready to put in the tanning vat.

Tanning With Acid

A well-tanned product depends on a number of factors each depending on the other--time of the year the animal is harvested, the health and condition of the animal, the make-up of the tanning solution, its strength and temperature, the care of the skin before tanning, and the amount of "breaking" or softening after tanning.

The production of a fine fur can be looked upon as taking place in three major steps. The first step is the removal of all the unwanted components such as flesh, fat, blood, dirt, leaving only the skin protein fibres and the hair. The second step is to treat these protein fibers with a tanning material that will stabilize their structure. The third step is to build onto the tanned fibers the desired characteristic of softness so as to produce a useful product.

Dry Skin

The steps involved when you start with a dry skin will be covered first.

STEP 1. Softening a dry skin for tanning

Soak the skin in a solution of cool, clean water, salt, borax and detergent. Use 1/4 cup of salt, one ounce of borax, and 2 ounces of a strong detergent for each gallon of water.

The purpose of this step is to bring the skin back to the same soft condition it was in when it was taken off the animal. The soaking should continue only long enough to soften the skin. Too long in the water will cause hair slip. Small skins can be worked by hand during the soaking to speed up the process. The time it takes to soften the skin depends on the condition and thickness of the skin. A thin skin such as a fox will soften in an hour or two while a large beaver may take 8 to 10 hours. The container you use should be large enough to hold all the skins you are going to work and still have room to work the skins up and down during the softening process.

STEP 2. Fleshing

This is scraping the flesh side to remove the inner muscular coat as well as adhering bits of flesh and fat. This exposes the true fibrous skin for the tanning action. A sharp, fine toothed metal edge can be used to scratch up the tough membranes after which they can be scraped off entirely. Other tools that have long been used for this are the back edge of a large knife or a small piece of pipe about 1 inch in diameter with a handle in one end and the other end sharpened from the inside. At the same time, much oil and fat can be worked out of the skin. The fleshing can be done with the skin stretched out on a flat piece of board or plywood or on a fleshing beam. Care must be taken to avoid cutting the skin which happens easily when using sharp tools. Do not injure the true skin or expose the hair roots.

Special Problems

Bear, Beaver, Seal---

These skins present special problems since they are extremely fatty. It may be necessary to wash these skins in kerosene. Gasoline has been used for this, however it is very dangerous. The damp skins are put in a plastic container with enough kerosene to thoroughly soak them. The skins are then worked and squeezed until all possible fat is washed from the skin. For very heavy or greasy skins, several such degreasings may be necessary.

The skin should next be washed out in water and detergent to remove all trace of the kerosene. These special problem skins are now ready for step 4.

STEP 3. Washing with a detergent

Wash the skin using a strong detergent. A stiff brush can be used on the larger skins to remove all animal fat. If it is not removed, it will prevent the tanning solution from soaking into the skin. Also, any fat left in the skin may become rancid after tanning and smell bad. One method of washing seal or beaver is to stretch them out on a piece of plywood and sprinkle with a generous amount of detergent and a small amount of water. Use a stiff brush and scrub good.

STEP 4. Rinse

Rinse in cool clean water at least two times. This is to remove all traces of the detergent. If the detergent is left in the skin, it will weaken the tanning solution. After each rinse, the skin should be squeezed out, not twisted, see Figure 8.

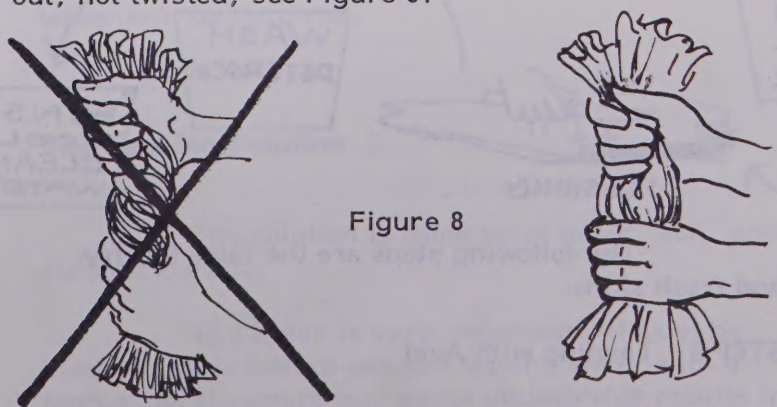


Figure 8

The skin should now be very soft and free of dirt, blood, and fat. It is now ready to go into the tanning solution.

Fresh Or Green Skins

These steps are involved when you start with a fresh or green skin:

STEP 1. Wash

Wash in cool water to remove all trace of blood and dirt. Blood stains should always be washed out in cool water as warm or hot water will set them and make them very difficult to remove.

STEP 2. Fleshing

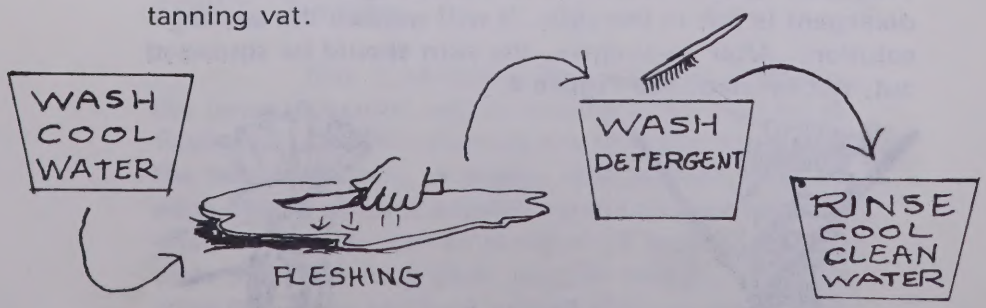
As in step two in working the dry skins, the fleshing removes the intermuscular coat and all bits of flesh and fat to expose the true fibrous skin for tanning.

STEP 3. Washing

Wash with a good detergent to remove all fat from the skin. A stiff brush may be used on the larger skins.

STEP 4. Rinse

Rinse the skins in cool clean water at least two times to remove all traces of detergent. If the detergent is not removed, it will weaken the tanning solution. After each rinse, squeeze the skin as shown in Figure 8. The skin should now be very soft and free of dirt, blood, and fat. It is now ready for the tanning vat.



The following steps are the same for dry and fresh skins:

STEP 5. Tanning with Acid

The Tanning Vat
The Tanning Solution
How to Mix the Tanning Solution

The Tanning Vat

When using an acid method of tanning, the tanning vat cannot be metal. Use a plastic garbage can or plastic bucket, Figure 9. It must be large enough to hold all the skins you have ready to tan. It must be clean. It should have a lid so small children cannot get into it.

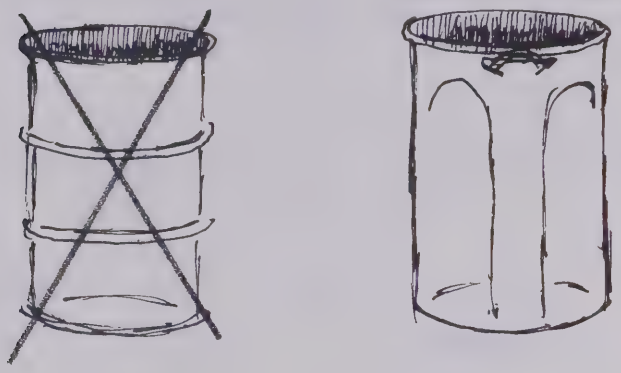


Figure 9

It should be placed where the temperature will stay around 65 degrees to 75 degrees F. If the temperature gets higher than this, the acid may damage the skins. If it is colder than 65 degrees F., the tanning will go very slowly. The size of the container you use depends on the kind and number of skins you tan. Twenty muskrat skins will fit in a five gallon plastic bucket. For a bear hide, a thirty gallon container will be required.

The Tanning Solution

The solution is made up of water, salt, and sulphuric acid.

The water is very important. It must be clean and it is best to use soft water. Water with a high mineral content may cause undesirable results in tanning. If the water is high in iron content, the acid and iron may make the skins black. Rain water or melted snow is very good to use for tanning.

The salt must be clean. Rock salt works fine and is less expensive than table salt. It may take a little longer to dissolve.

The sulphuric acid can be one of three kinds. First, a concentrated sulphuric acid similar to that used in laboratories; second, new battery fluid like that put in new batteries (Do Not take it out of a battery--Use only new fluid as it comes out of the plastic bags); and third, sodium bisulfate ($NaHSO_4H_2O$) --this is a crystal form and may be easier and safer to handle. The amounts of each kind of acid to use for one gallon of water are shown below:

One gallon of water
one pound of salt
one ounce of concentrated sulphuric acid

OR

One gallon of water
one pound of salt
four ounces of battery fluid

OR

One gallon of water
one pound of salt
½ cup of sodium bisulfate crystals

In addition to these three kinds of acid, you can use oxalic acid. It is more expensive and also is poisonous. Like the sulphuric acids, it cannot be sent by mail or air freighted where passengers are carried. It must go by freight-only shipments. The amount of oxalic acid to use is shown below:

One gallon of water
one pound of salt
two ounces of oxalic acid

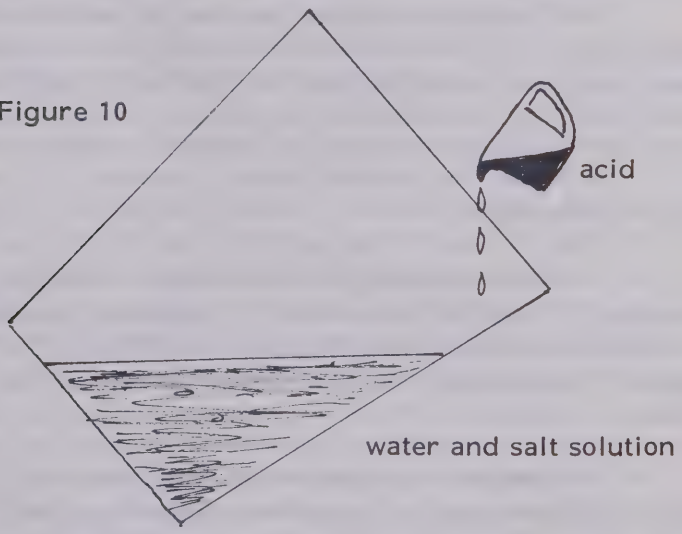
How To Mix The Tanning Solution

Start with a clean plastic container and add water that is around 70 degrees F.

For each gallon of water, add one pound of salt. A wooden stick can be used to stir this until all of the salt is dissolved.

After the salt is dissolved, use a plastic or glass measuring cup to measure out the amount of sulphuric acid you need. Now tilt the tanning vat as shown in Figure 10 and let the acid drip down the side slowly. Always add the acid to the water, never add water to acid. Even when you add the acid slowly, it will hiss and bubble and give off a strong odor. Do not breathe the fumes that come from the mixing.

Figure 10



Now stir the entire mixture. The acid is diluted enough so you can put your hands in it. It is a good idea to rinse the acid measuring cup out in the tanning solution.

CAUTION! CAUTION! When these tanning acids are kept in the village, they must be kept where children cannot get into them as the acid can cause very bad burns!

The tanning solution is now ready to be used. The skins are ready for the tanning solution, so put the skins in and make sure they are completely under the solution. A wooden stick can be used to punch the skins down. You can use your hands, but if you keep your hands in the solution all day, the

salt and acid will cause your hands to turn red and sore. When you are working with the skins in the tanning vat, you may want to use rubber gloves to protect your hands.

How Long To Leave The Skins In The Tanning Solution

A light skin like a fox will tan in 2 or 3 days. A heavier skin such as beaver or seal may take 4 or 5 days. The thicker the skin, the longer it takes to tan. You should plan ahead and have time to take the skins out. However, if necessary, you can leave the skins in for a much longer period of time. Up to 30 days won't hurt as long as the temperature stays below 75 degrees F.

How Long To Use The Solution

The solution can be used until it starts to smell bad. This in turn depends on how clean the skins were when they were put into the solution. The bits of fat and flesh that come off the skin will become rancid and start to smell bad in a few weeks at 70 degrees F.

STEP 6. Neutralize

After removing the skin from the tanning solution, it must be neutralized. The tanning solution is very strong acid, and if it is not neutralized, the acid will continue acting and eventually weaken the fiber.

The skins should be removed from the tanning solution and all possible solution squeezed out of them. Do not twist the skin, squeeze out as shown in Figure 8.

To neutralize, put the skin in a solution containing one ounce of borax per gallon of cool water, or if available use one ounce of washing soda per gallon of cool water. Leave the skins in this solution for 20 minutes for a thin skin and up to two hours for a thick heavy skin.

STEP 7. Rinse

The skin should now be rinsed at least two times in cool clean water. All of the tanning steps have been completed and the skins are ready for stretching and drying.

Drying And Softening

STEP 8. Stretching

The skins are now ready to be stretched out for drying and lubricating.

The methods of stretching are the same as described in the section on skin care. Those skinned open are laced in a frame or nailed out on a board (Figures 4, 5, and 6). Those skinned cased are put on a skin stretcher as shown in Figure 2.

STEP 9. Lubricating

For hundreds of years the home tanning methods have included the addition of some kinds or combinations of animal fats as a lubrication to help soften the skin. This can also make the skin last longer when made into clothing or craft items.

When the skin has been rinsed for the last time and is stretched, allow it to dry for 2 to 6 hours, depending on the thickness of the skin. Then apply a thin coat of neatsfoot oil to the flesh side. Be careful along the edge of the skin and around the holes so that the oil does not go into the hair. In a warm room, around 70 degrees to 75 degrees F., this oil will soak into the skin in 6 to 12 hours. After this happens, apply a thin coat of the tanning oil or leather dressing. On a heavy or thick hide, such as on the neck or shoulder area of a seal skin, you should apply a second coat of tanning oil. After the tanning oil has soaked in, you can start the softening process.

STEP 10. Drying and softening

The skins are now ready for the final drying and softening. The drying time depends on the thickness of the fur and skin, air temperature, and air movement.

Drying is a very critical time in the tanning process. When they start to show light colored areas, they must be worked. This is called breaking soft. The breaking or working can be done on a "staking board", a board that is rounded and beveled to a 1/16 inch edge at the top, Figure 11. Small skins also can be worked by hand, Figure 12. Stretch or work the skins in both directions until the entire skin is soft.

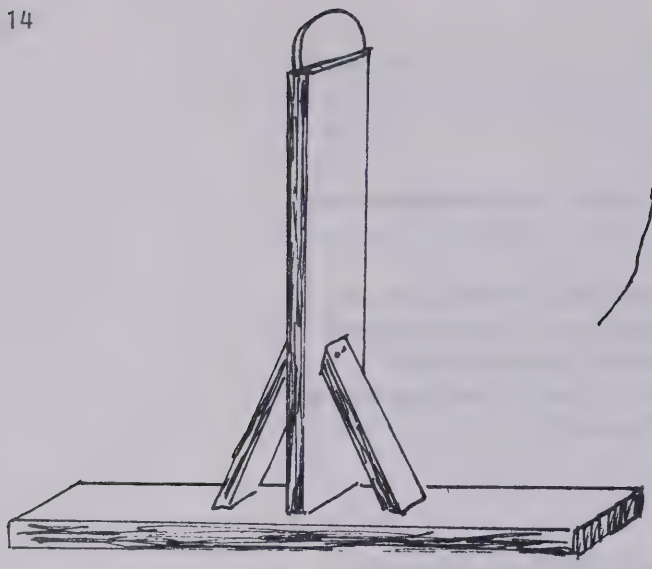


Figure 11

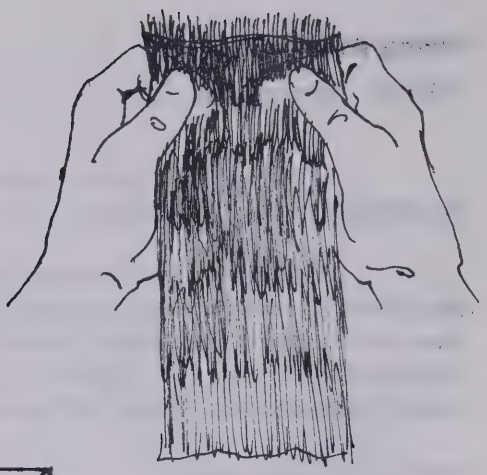


Figure 12

To obtain a smooth finish on the flesh side, sandpaper can be used. The thicker the skin, the coarser the sandpaper you can use. Make sure there are no wrinkles in the skin or small particles under the skin or the sandpaper will cut a hole in the skin. If the skins are to be sewn, the sandpaper can also be used to cut them down to uniform thickness, Figure 13. Skins that are laced in a frame to dry can be softened somewhat by working them with a scraper as shown in Figure 14.

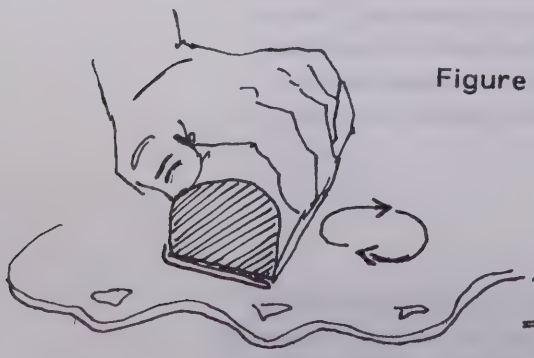


Figure 13

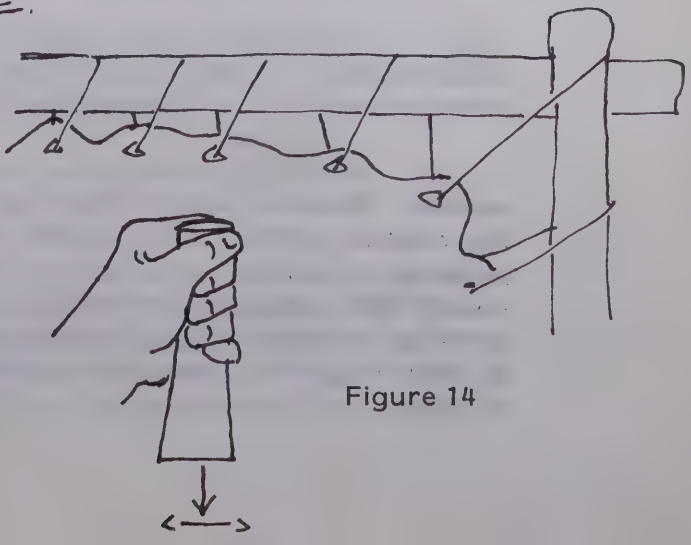


Figure 14

Tanning With Glutaraldehyde

A second method of tanning involves the use of glutaraldehyde. The process was developed by the Eastern Regional Research Laboratory, USDA, for tanning sheepskins used for hospital bed pads. Sheepskins with the wool trimmed but not removed make cool, comfortable bed pads that prevent bedsores. The wool pile absorbs perspiration and provides good distribution of body heat. The glutaraldehyde tanning process makes them readily washable.

This method has been used successfully on several Alaskan furs. However, white skins should not be tanned in glutaraldehyde as it turns the skin and fur or hair a pale yellow color.

The care and preparation of the skin is the same as in the acid-salt method, so the use of the glutaraldehyde should begin with step 5.

For each pound of the drained, wet weight of the cleaned skin, place 5 quarts of water (approximately 85 degrees F.) in a clean, plastic barrel. Stainless steel containers may be used for glutaraldehyde tanning, but iron or galvanized tubs should never be used. Add 1/2 pound of salt for each gallon of water and dissolve by stirring with a wooden paddle. Measure 1 1/8 fluid ounces of glutaraldehyde (50 per cent commercial solution) for each pound of the drained, wet weight of the cleaned skin, pour it carefully into the salt solution and stir well.

Glutaraldehyde is irritating and contact with the skin and eyes or inhalation of vapors should be avoided. The use of rubber gloves, a rubber apron, a safety-visor or safety glasses, and adequate ventilation is recommended.

Table 1 AMOUNT OF INGREDIENTS TO USE FOR GLUTARALDEHYDE TANNING BASED ON THE POUNDS OF WET DRAINED SKINS

Pounds of Skins	Gallons of Water	Pounds of Salt	Ounces of Glutaraldehyde
1	1 1/2	3/5	1 1/8
2	2 1/2	1 1/4	2 1/4
4	5	2 1/2	4 1/2
6	7 1/2	3 3/4	6 3/4
8	10	5	9
10	12 1/2	6 1/4	11 1/4
12	15	7 1/2	13 1/4
14	17 1/2	8 3/4	15 3/4
16	20	10	18
18	22 1/2	11 1/4	20 1/4
20	25	12 1/2	22 1/2
22	27 1/2	13 3/4	24 3/4
24	30	15	27
26	32 1/2	16 1/4	29 1/4
28	35	17 1/2	31 1/2
30	37 1/2	18 3/4	33 3/4
35	43 3/4	22	39 3/4
40	50	25	45
45	56 1/4	28	50 1/2
50	62 1/2	31	56 1/4

Immerse the skin carefully in the glutaraldehyde solution to avoid splashing. Stir for about 5 minutes with a wooden paddle, then for one minute at hourly intervals during the day. Cover the barrel with a cover between stirrings and overnight. After several hours the color of the skin becomes pale yellow as tanning proceeds. Allow to stand overnight with the skin completely immersed. Stir one minute per hour the second day. Continue the tanning for at least 48 hours. Even though the maximum tanning can be obtained in about 48 hours when the tanning solution is about 70 degrees F., the glutaraldehyde continues to combine with the skin and a fuller, softer leather can be obtained by continuing the tanning for another 6 or 8 hours.

One way to tell when a heavy hide such as moose is tanned is to cut off a small piece of it and trace its size on a piece of paper. Then drop the piece of skin into boiling water for two minutes. If the skin shrinks a great deal, it is not yet tanned. A completely tanned skin will shrink only a little. Drain, then wash in several changes of water. Hang the skin, fur side up, over a wooden sawhorse or board overnight.

Fat-Liquoring, Drying And Staking

Weigh accurately an amount of a suitable fat liquor oil (for example: a highly sulfated neats-foot oil or a sulfited sperm oil) equal to 3 percent of the original drained weight of the scoured skin. If the skin is very greasy, reduce the amount of fat liquor. Add an approximately equal volume of warm water while stirring, to form an emulsion. Add a volume of clear ammonia equal to 1/2 percent of the drained weight of the scoured skin and stir.

SAMPLE RECIPE FOR FAT-LIQUOR

10 lbs. of skin = 160 oz.
160 oz. x 3% = 4.8 or 5 oz. of oil.
160 oz. x .05% = .8 or 1 oz. of ammonia.

Divide the fat liquor into two equal volumes. Place the skin on a flat surface. Apply a small amount of the fat liquor emulsion by hand or bristle brush to an approximately 10- inch square area of the flesh surface and spread evenly and quickly with a back-and-forth motion. Repeat until the entire flesh side has been covered. After 30 minutes apply the second portion of the fat liquor as above. With practice the fat liquor can be applied uniformly. Place the skin, flesh side up, on a flat surface and cover with an impervious sheet of plastic such as polyethylene overnight. If several skins are fat-liquored at one time, they may be piled, flesh side to flesh side, overnight.

The next day place the skin, fur side up, over a wooden sawhorse and dry the fur at room temperature. An electric fan may be used to speed the drying. Then nail the skin, fur side down, to a plywood board, stretching it slightly, Figure 6. Space the nails every 2 or 3 inches around the circumference and about 1/2 inch in from the edge. Dry the flesh side at room temperature. When nearly dry, test the edge of the leather by stretching a small area with the fingers. When the color lightens considerably, pull the nails and stake the leather by pulling the flesh side repeatedly back and forth in all directions over the edge of a staking board, Figure 11. Staking must be started at the proper moisture content. Continue staking at intervals until the leather is dry. If the dry leather is not soft and pliable, dampen the flesh side lightly with water and cover with plastic for at least several hours, or preferably overnight. Dry and stake as above. If necessary repeat the dampening and staking until the leather remains soft and flexible.

Grease spots on the dry leather can be removed by sponging with a dry-cleaning solvent. Solvents should be used in a well ventilated area.

Finishing

The flesh side of the leather may be cleaned and made smooth by rubbing lightly with medium-grade sandpaper fastened to a block of wood, or by use of a sanding machine. The thicker areas such as the neck may be sanded to make the leather thinner and more flexible.

The fur should be combed out carefully, using a widely-spaced, metal-tooth dog comb. The narrow-spaced side of the comb may be used for the second combing.

Laundering

Skins tanned with glutaraldehyde can be successfully laundered many times by hand or in an automatic washing machine. Use moderately warm water at not over 120 degrees F. (fine fabric setting) and a mild soap or detergent. Wash for 5 minutes. Longer washing periods may mat or felt the fur. Rinse with clear, cool water several times. If necessary, repeat the washing and rinsing. Spin to extract the water. If hand laundered, shake out the excess water by hand. Hang at room temperature to dry, which will require about 48 hours.

Material Suppliers

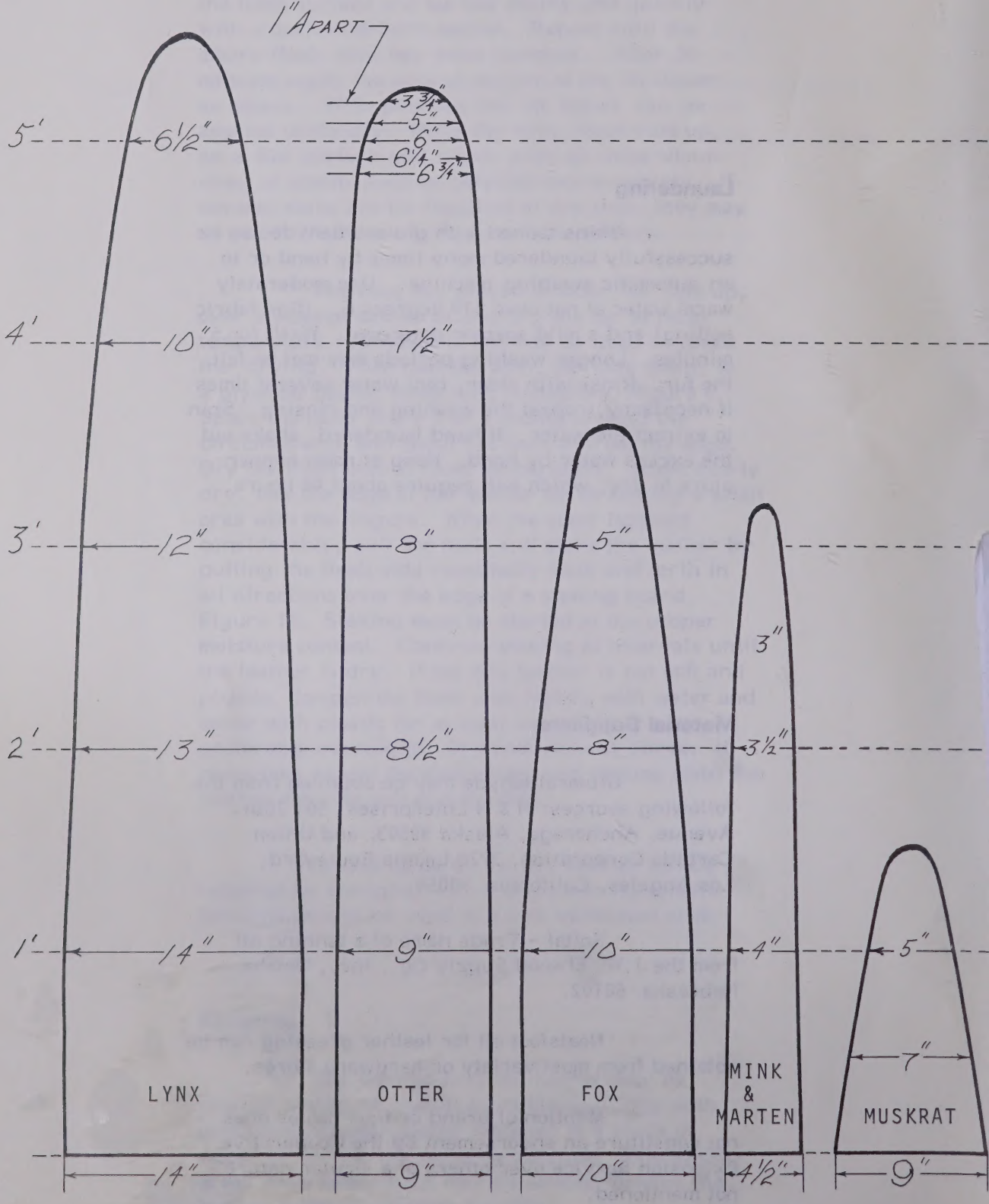
Glutaraldehyde may be obtained from the following sources: H & H Enterprises, 501 20th Avenue, Anchorage, Alaska 99503; and Union Carbide Corporation, 2770 Leonis Boulevard, Los Angeles, California 90058.

Softal - Trade name of a tanning oil from the J.W. Elwood Supply Co., Inc., Omaha, Nebraska 68102.

Neatsfoot oil for leather dressing can be obtained from most variety or hardware stores.

Mention of brand or firm names does not constiture an endorsement by the Cooperative Extension Service over others of a similar nature not mentioned.

These stretcher patterns show the shape of the skin; however, when making a stretcher, the size of your skins must be considered.



Patterns for Skin Stretchers

DRY SKINS

FRESH SKINS

This flow chart shows the steps that are necessary in preparing a dry or fresh skin for the tanning vat, the tanning process, and the softening. It includes what you do, why you do it, and how you do it or what tools and equipment you use. The author is aware of the many methods of home tanning, but feels it is necessary to mention only a very few. For those of you who have worked with skins or will work with skins, you will undoubtedly read of many different ways to tan, some of which may fill your needs better than others.

1. SOFTEN
   To each gallon water:
   ¼ cup salt
   1 ounce borax
   2 ounces strong detergent
   Soak till skin is soft.

2. FLESH
   Scrape off flesh, fat and muscular coat.

3. WASH
   To each gallon water:
   ¼ cup powdered clothes washing detergent

4. RINSE
   Cool clean water.
   Rinse several times to remove all detergent.

1. WASH
   Cool water.

2. FLESH
   Scrape off flesh, fat and muscular coat.

3. WASH
   To each gallon water:
   ¼ cup powdered clothes washing detergent

4. RINSE
   Cool clean water.
   Rinse several times to remove all detergent.

DO NOT BREATHE FUMES
ACID BURNS!

5. TAN
   In plastic bucket to each gallon water:
   1 pound salt
   4 ounces battery fluid
   (See other formulas in tanning publication.)

6. NEUTRALIZE
   To each gallon water:
   1 ounce borax or
   1 ounce washing soda
   Soak 20 minutes to 2 hours depending on skin thickness.

7. RINSE
   Cool clean water.

8. STRETCH
   Lace to frame or nail to board.
   Dry 2 to 6 hours.

9. LUBRICATE
   Apply neatsfoot oil to flesh side in warm room.
   Wait 10 to 12 hours.
   Apply tanning oil or leather dressing.
   Wait until oil has soaked into hide.
   Dry.

10. DRY AND SOFTEN
    Stretch or work in both directions until skin is soft.
    Sand flesh side if desired.

CAUTION

ADD ACID TO WATER
AND SALT SLOWLY